Claims

[1] A multifunctional material characterized by having at least a surface layer comprising a carbon-doped titanium oxide layer, having the carbon doped in a state of Ti-C bonds, being excellent in durability, and functioning as a visible light responding photocatalyst.

[2] The multifunctional material according to claim 1, characterized in that the carbon-doped titanium oxide layer contains 0.3 to 15 at% of carbon.

[3] The multifunctional material according to claim 1 or 2, characterized in that Vickers hardness of the carbon-doped titanium oxide layer is 300 or higher.

[4] The multifunctional material according to claim 3, characterized in that the Vickers hardness of the carbon-doped titanium oxide layer is 1,000 or higher.

[5] The multifunctional material according to any one of claims 1 to 4, characterized in that the multifunctional material is composed of the carbon-doped titanium oxide layer as the surface layer, and a core material, and the core material is titanium, a titanium alloy, a titanium alloy oxide, or titanium

oxide.

[6] The multifunctional material according to any one of claims 1 to 4, characterized in that the multifunctional material is composed of the carbon-doped titanium oxide layer as the surface layer, an intermediate layer, and a core material, the intermediate layer is titanium, a titanium alloy, a titanium alloy oxide, or titanium oxide, and the core material is composed of a material other than titanium, a titanium alloy, and titanium oxide.

[7] The multifunctional material according to claim 1, 2, 5 or 6, characterized in that the multifunctional material is powdery.

[8] The multifunctional material according to any one of claims 1 to 7, characterized in that the carbon-doped titanium oxide layer as the surface layer is bound via the Ti-C bonds to titanium, a titanium alloy, a titanium alloy oxide, or titanium oxide as a layer below the surface layer.

[9] The multifunctional material according to any one of claims 1 to 8, characterized in that the carbon-doped titanium oxide layer contains a titanium alloy component.

[10] The multifunctional material according to any one of claims 1 to 9, characterized in that the titanium alloy is Ti-6Al-4V, Ti-6Al-6V-2Sn, Ti-6Al-2Sn-4Zr-6Mo, Ti-10V-2Fe-3Al, Ti-7Al-4Mo, Ti-5Al-2.5Sn, Ti-6Al-5Zr-0.5Mo-0.2Si, Ti-5.5Al-3.5Sn-3Zr-0.3Mo-1Nb-0.3Si, Ti-8Al-1Mo-1V, Ti-6Al-2Sn-4Zr-2Mo, Ti-5Al-2Sn-2Zr-4Mo-4Cr, Ti-11.5Mo-6Zr-4.5Sn, Ti-15V-3Cr-3Al-3Sn, Ti-15Mo-5Zr-3Al, Ti-15Mo-5Zr, or Ti-13V-11Cr-3Al.

[11] A visible light responding photocatalyst characterized by having at least a surface layer comprising a carbon-doped titanium oxide layer, and having the carbon doped in a state of Ti-C bonds.